

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

2

**AMENDMENTS TO THE CLAIMS:**

1. (Currently Amended) A semiconductor device, comprising:

a multi-layered insulation film formed on a semiconductor substrate, said multi-layered insulation film comprising:

a first insulation layer comprising an organic material having a dielectric constant which is lower than a silicon oxide dielectric constant;

a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said first insulation layer;

a third insulation layer comprising an inorganic material and formed on and adhering to a top of said second insulation layer; and

a plurality of wires embedded in a groove formed in said multi-layered insulation film, said multi-layered insulation film being disposed between said wires,

wherein said second insulation layer comprises a hydride organosiloxane.

2. (Previously Presented) The semiconductor device according to claim 1, wherein said first insulation layer comprises at least one of an organosiloxane and an aromatic-containing organic resin.

3. (Canceled)

4. (Previously Presented) The semiconductor device according to claim 1, wherein said third

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

3

insulation layer comprises at least one material selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride.

5. (Currently Amended) A semiconductor wafer, comprising:

a multi-layered insulation film formed on a surface of the wafer, said multi-layered insulation film comprising:

a first insulation layer comprising an organic material having a dielectric constant which is lower than a silicon oxide dielectric constant;

a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said first insulation layer;

a third insulation layer comprising an inorganic material and formed on and adhering to a top of said second insulation; and

a plurality of wires embedded in a groove formed in said multi-layered insulation film, said multi-layered insulation film being disposed between said wires,

wherein said second insulation layer comprises a hydride organosiloxane.

6. (Previously Presented) The semiconductor wafer according to claim 5, wherein said first insulation layer comprises at least one of an organopolysiloxane and an aromatic-containing organic resin.

7. (Canceled)

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

4

8. (Previously Presented) The semiconductor wafer according to claim 5, wherein said third insulation layer comprises at least one material selected from the group consisting of silicon oxide, silicon nitride and silicon oxynitride.

9-30. (Canceled)

31. (Previously Presented) The semiconductor device according to claim 1, wherein said dielectric constant of said first insulation layer is no greater than 3.5.

32. (Previously Presented) The semiconductor device according to claim 2, wherein said organopolysiloxane comprises at least one of an alkyl silsesquioxane and a hydride alkyl siloxane.

33. (Previously Presented) The semiconductor device according to claim 2, wherein said aromatic-containing organic resin comprises at least one of a polyaryl ether and a divinyl siloxane-bis-benzocyclobutene.

34. (Previously Presented) The semiconductor device according to claim 1,  
wherein said first insulation layer comprises a thickness greater than a thickness of said second insulation layer, and  
wherein said first insulation layer comprises a thickness greater than a thickness of said

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

5

third insulation layer.

35. (Previously Presented) The semiconductor device according to claim 1, wherein said second insulation layer comprises a first layer and a second layer placed in said first layer.

36. (Currently Amended) The semiconductor device according to claim 1, wherein said second first insulation layer comprises methyl silsesquioxane.

37. (Previously Presented) The semiconductor device according to claim 1, wherein a bottom of said groove is formed on a same surface as said first insulation layer.

38. (Previously Presented) The semiconductor device according to claim 1, wherein said plurality of wires comprise copper wires.

39. (Previously Presented) The semiconductor device according to claim 42, wherein said second insulation layer comprises a methylated hydrogen silsesquioxane (MHSQ) film.

40. (Currently Amended) The semiconductor device according to claim 39 42, wherein said MHSQ film comprises a thickness of about 50 nm.

41. (Currently Amended) A semiconductor device having a damascene wiring structure, said

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

6

semiconductor device comprising:

a multi-layered insulation film formed on a semiconductor substrate, said multi-layered insulation film having a plurality of recesses and comprising:

a first insulation layer comprising an organic material having a dielectric constant which is lower than a silicon oxide dielectric constant;

a second insulation layer comprising a polysiloxane compound having an Si-H group and formed on and adhering to a top of said first insulation layer;

a third insulation layer comprising an inorganic material and formed on and adhering to a top of said second insulation layer; and

an electroconductive film formed in each recess in said plurality of recesses, said multi-layered insulation film being disposed between each recess in said plurality of recesses,

wherein said second insulation layer comprises a hydride organosiloxane.

42. (Currently Amended) A semiconductor device comprising a multi-layered insulation film and a plurality of wires formed on a semiconductor substrate, said multi-layered insulation film comprising:

a first insulation layer comprising an organic material having a dielectric constant which is lower than a silicon dioxide dielectric constant;

a second insulation, adhesive layer comprising a polysiloxane compound having an Si-H group and formed on and being in contact with a top of said first insulation layer; and

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

7

a third insulation layer comprising an inorganic material and formed on and being in contact with a top of said second insulation, adhesive layer,

wherein said multi-layered insulation film is disposed between said wires in said plurality of wires, and

wherein said plurality of wires are embedded in a groove formed in said multi-layered insulation film, and

wherein said second insulation layer comprises a hydride organosiloxane.

43. (Previously Presented) The semiconductor device according to claim 1, wherein said first insulation layer, said second insulation layer and said third insulation layer of said multi-layered insulation film comprise substantially uniform widths.

44. (Previously Presented) The semiconductor device according to claim 1, wherein a surface of said multi-layered film is substantially coplanar with a surface of said plurality of wires.

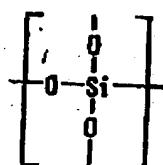
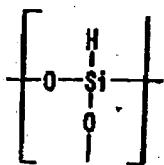
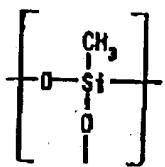
45. (Previously Presented) The semiconductor device according to claim 1, wherein said second insulation layer is formed by one of a plasma CVD and a spin coating process where said semiconductor substrate is continuously maintained in a plasma atmosphere.

46. (Currently Amended) The semiconductor device according to claim 31, wherein said hydride organosiloxane comprises methylated hydrogen silsesquioxane comprises including repeating

Serial No. 09/851,313  
Docket No. NEC01P069-MSb

8

units shown by formulae I, II and III



(I)

(II)

(III)

, and

wherein a molar ratio of [II] to a total of I, II and III is at least 0.2.